Fertilizing Grass Pastures and Hay Lands

Pastures are important to many livestock producers in Nebraska, but production from many pastures is low. Research shows that fertilizing, weed control and rotational grazing increases grass production from pastures, resulting in greater livestock production.

Fertilizing and controlling weeds on hay lands also increases production. Since more nutrients are removed from the field when harvested as hay than when it is pastured, even more attention needs to be paid to fertilization for hay lands than pastures.

In addition to increasing grass production, fertilizing can improve forage quality. On-the-farm demonstrations show that fertilizing increases the amount of beef produced per acre, even in a dry year. This increased production is primarily a result of added carrying capacity, rather than an increase in average daily gain.

Nitrogen Management on Grasslands

Apply nitrogen (N) fertilizer yearly to grass pastures and hay lands to maximize production. Nitrogen improves both grass yield and protein content. It also improves the vigor of grass plants, which can thicken stands and reduce weed invasion. When adequate soil moisture is present, economical rates of nitrogen can more than double forage production.

Note fertilization with nitrogen is most economical where weeds have been controlled and additional grass growth is needed for livestock. If additional forage can be purchased or pasture rented at a lower cost than fertilizer, these alternatives may be better choices than applying fertilizer to the pasture. Naturally, if one fertilizes to increase production but does not need the extra forage, fertilization will not be an economically sound practice.

Nitrogen fertilizer applied just prior to the period of most rapid grass growth assures the applied nitrogen is available to the plants.

Fertilizing Cool-Season Grasses

For cool-season grasses, such as smooth brome, maximum growth occurs in mid- to late-spring. These grasses grow very little in July and August. Growth resumes on cool-season grasses in late August and September if soil moisture is adequate and temperatures are favorable. Fall growth, however, is only a small portion of the total growth for the entire growing season.

Nitrogen can be applied in either fall or spring on cool-season grasses. The risk of losing applied nitrogen by either leaching or run-off is reduced if it is applied in early spring. Therefore, spring applications are preferred. Some people will apply two applications of nitrogen, this practice is known as split application of nitrogen. Split applications of nitrogen for production of cool-season grasses under dryland conditions are useful only when more than 100 pounds of nitrogen per acre are to be applied during the growing season and good growing conditions are anticipated during September and October.

Fertilizing Warm-Season Grasses

Apply fertilizer in mid- to late-May to pastures and hay lands containing warm-season grasses, such as switchgrass, Indiangrass, big bluestem and little bluestem. Do not fertilize warm season grasses in early spring. Early spring application increases the risk of leaching nitrogen fertilizer below the rootzone and it will stimulate growth of cool season species that compete with the warm-season grass species. Begin fertilizer application in mid-May in southern Nebraska and delay until late-May in the northern portion of the state.

Fertilizing Mixed Grass Pastures

Some pastures and hay lands contain a mixture of both cool- and warm-season grasses. Fertilizing these pastures with nitrogen in early spring stimulates the cool-season grasses which crowd out any warm-season grasses present. To maintain warm-season grasses in such a mixture, fertilize in late May. It also may be necessary to apply herbicides or conduct prescribed burns to suppress the cool-season grasses.

Liquid and dry forms of nitrogen fertilizer are equally effective for increasing pasture production when certain precautions are taken. Do not apply urea nitrogen to pasture or hay lands on high pH calcareous soils when air temperatures are above 85° F. Nitrogen losses from ammonia volatilization can be high under these conditions. Since urea supplies more than half the nitrogen in 28 percent liquid N (urea ammonium nitrate), be aware of the potential for volatilization losses from this nitrogen source as well.

Pasture production is highly dependent on rainfall, so nitrogen recommendations are adjusted accordingly. Suggested application rates for nitrogen are shown in *Table 1*. The lower rates listed are the minimum amounts recommended for average conditions and management situations. Even in years when summer rainfall is below normal, the use of 80 pounds of nitrogen per acre usually will increase production economically on pastures and hay lands in eastern and northeastern Nebraska. Use the higher rates listed for each zone when there is a full profile of subsoil moisture at the start of the growing season.

Table II. Phosphorus Recommendations for Grasslands in Nebraska

	Soil Test Levels		
Relative Index Value	Bray & Kurtz #1	Olsen P ($NaHCO_3$)	Phosphorus Rate lbs P_2O_5/A
	ppm		
Very Low	0-5	0-3	40
Low	6-15	4-7	20
Medium	16-25	8-14	10
High	25+	15+	0

Phosphorus Fertilizer on Pastures and Hay Lands

In addition to nitrogen, phosphorus fertilizer also is needed on many pastures in Nebraska. Research in eastern and northeastern Nebraska shows the combination of nitrogen and phosphorus frequently produces higher yields than the application of either nutrient alone.

Phosphorus recommendations are based on the availability of phosphorus in the soil as measured by a soil test. Phosphorus recommendations for grasslands are listed in *Table II*. If legumes make up one-fourth or more of the stand, apply 50 percent more phosphate than for grass alone. Phosphate fertilizers can be applied with the nitrogen in either spring or fall.

Repeated applications of phosphate fertilizers may increase the level of available phosphorus in the soil. When soil phosphorus levels are in the high range, phosphate application can be eliminated until soil test levels fall below the high range. When grasslands are used as hay lands, soil sample more frequently. Phosphorus may need to be applied more often, since removal of nutrients will be greater than on grazed land.

Other Nutrients

Results of studies conducted throughout eastern and northeastern Nebraska indicate applying potash, sulfur and zinc does not improve pasture production. There is a small possibility some pastures and grasslands on sandy soils may require sulfur. This need for sulfur, however, has not yet been demonstrated in research trials.

Source: NebGuide G-406, Fertilizing Grass Pastures and Hay Lands, by Bruce Anderson, Extension Forage Specialist and Charles A. Shapiro, Extension Soils Specialist. (TD)

Table I. Nitrogen Recommendations for Pastures and Haylands in Nebraska

Pounds of Nitrogen to Apply per Acre*

	Cool-season Grasses		Warm-season Grasses	
Zone	Pasture	Hayland	Pasture	Hayland
I	80-120	100-150	60-90	75-100
II	50-80	60-90	40-75	50-80

Zone I is southeast of a line running from Blair, in Washington county to Hebron, in Thayer county and includes all of Lancaster County except the Branched Oak Lake area. Zone II is southeast of a line running from Niobrara in Knox county to Alma in Harlan county down to Zone I.

*Use the higher rate when a full profile of subsoil moisture is present.

Liming Acid Soils — pH and Buffer pH

Question: My soil test report shows a number for pH and another number for buffer pH. What does pH measure and what is the difference between pH and buffer pH?

Answer: pH is a measure of the acidity or alkalinity of a soil. When the soil solution (the water in the soil) contains equal numbers of hydrogen ions (H^+) ions as hydroxyl (OH^-) ions, the soil is neutral and the pH of the soil is 7.0. When there are more H^+ than OH^- ions, the soil is acidic and has a pH of less than 7.0. When there are more OH^- ions than H^+ ions, the soil is alkaline and has a pH greater than 7.0. The scale is logarithmic. A soil with a pH of 6.0 is 10 times more acidic than a soil with a pH of 7.0. A soil with a pH of 5.0 is 10 times more acidic than a soil with a pH of 6.0 and 100 times more acidic than a soil with a pH of 7.0.

Soil acidity can be thought of as two types: active or soil solution acidity and reserve or exchangeable acidity. The active acidity of a soil is measured directly by a pH meter in the lab.

Reserve acidity depends on several factors, such as amount and type of clay, amount of organic matter and soluble aluminum concentration in the soil. Therefore, two soils can have the same measured pH, but will require different amounts of lime to change the pH value and correct it back to a more neutral pH.

A chemical test using a buffer, is performed in the laboratory to determine the amount of calcium carbonate equivalent (CCE) necessary to raise the soil pH of an acid soil to a desired level. This buffer solution reacts with the soil to neutralize both the active and reserve acidity. The change in the pH of the buffer solution in the laboratory has been calibrated for lime rate required in the field. This measurement is reported on the soil test report as buffer pH. A rule of thumb for buffer pH values is, for every 0.1 point below pH 7.0, it takes about 1,000 pounds of ag lime (60 percent CCE) to bring the top seven inches of soil (about two million pounds of soil) up to a measured pH value of 6.5 (6.5 is considered the ideal pH for most crops).

For example, a soil with a buffer pH of 6.3 would require (7.0 - 6.3= 0.7) x 1,000 pounds per acre per 0.1 = 7,000 pounds of ag lime per acre to bring the pH value up to 6.5. If the lime is incorporated deeper than seven inches, larger amounts of lime are required to neutralize the acidity because you are affecting a greater mass of soil.

For more information, consult in-house educational resource *Answers to Questions about Liming Acid Soils* online at http://lancaster.unl.edu/ag/Factsheets/303-03.pdf or *Liming Acid Soils* from Kansas State University online at www.oznet.ksu.edu/library/CRPSL2/MF1065.PDF (TD)

Scrap Tire Collection May 15 & 16

Individuals will have an opportunity to get rid of scrap tires that may have accumulated around your place. Tires (without the wheels) will be accepted May 15 and 16 from 9 a.m. to 9 p.m. at the Shoemakers south parking lot 48th and West O Street, Lincoln. Three hundred and fifty tons of tires will be accepted in this recycling effort on a first-come, first-served basis. Please have a count of the number of tires you are dropping off.

This program is funded through a grant from the Nebraska Department of Environmental Quality and hosted by officials from Sanitary Improvement District Number 6.

Sorry, this opportunity is open to individuals only — the grant specially prohibits tire dealers.

For more information, call (402) 476-3590. (TD)